

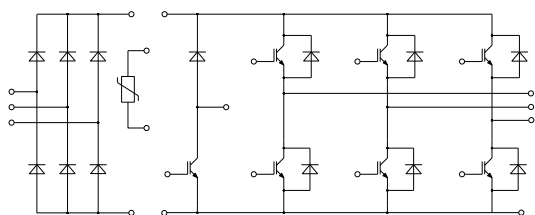
Features

- Low Switching Losses
- Low $V_{ce(sat)}$ with Positive Temperature Coefficient
- Including Fast & Soft Recovery Anti-parallel FWD
- Low Inductance Case
- High Short Circuit Capability(10 μ s)
- Maximum Junction Temperature 175°C
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Applications

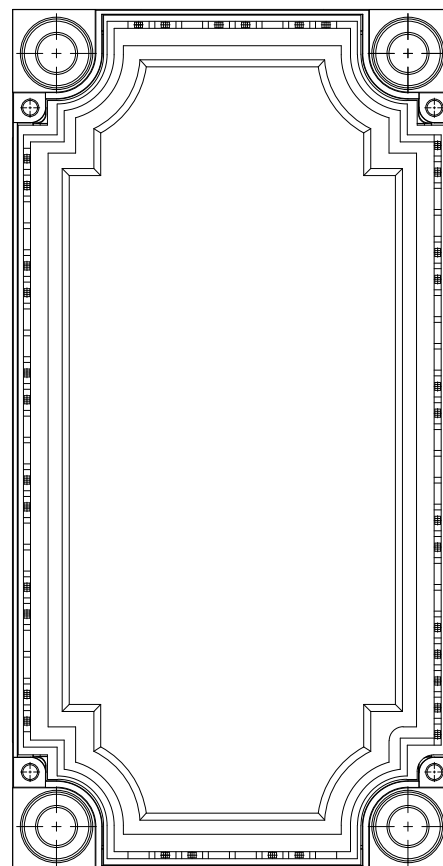
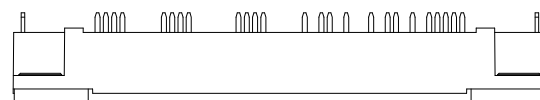
- Motor Drivers
- AC and DC Servo Drive Amplifier
- UPS (Uninterruptible Power Supplies)

Circuit Diagram



IGBT Modules 1200V 75A

E2A



● IGBT- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=80^{\circ}C, T_{vjmax}=175^{\circ}C$	75	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	150	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	476	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=3mA, T_{vj}=25^{\circ}C$	5	5.8	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=75A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.15	V
		$I_C=75A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.05		V
		$I_C=75A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.1		V
Gate Charge	Q_g			0.85		μC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		4.2		nF
Reverse Transfer Capacitance	C_{res}			0.32		
Internal Gate Resistance	R_{gint}			10		Ω
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=75A, V_{GE}=\pm 15V, R_G=5.1\Omega, T_{vj}=25^{\circ}C$		100		ns
Rise Time	t_r			78		
Turn-Off Delay Time	$t_{d(off)}$			380		
Fall Time	t_f			32		
Turn-On Energy	E_{on}			5.6		mJ
Turn-Off Energy	E_{off}			3.6		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=75A, V_{GE}=\pm 15V, R_G=5.1\Omega, T_{vj}=125^{\circ}C$		110		ns
Rise Time	t_r			85		
Turn-Off Delay Time	$t_{d(off)}$			450		
Fall Time	t_f			36		
Turn-On Energy	E_{on}			8.8		mJ
Turn-Off Energy	E_{off}			6.4		
SC Data	I_{SC}	$T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C, V_{CC}=900V, V_{CEM} \leq 1200V$		370		A

● Diode- Inverter

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		75	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	150	A
I^2t -value	I^2t	$V_R=0, t_p=10ms, T_{vj}=125^{\circ}C$	810	A^2s
		$V_R=0, t_p=10ms, T_{vj}=150^{\circ}C$	690	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	$I_F=75A, T_{vj}=25^{\circ}C$		1.95	2.25	V
		$I_F=75A, T_{vj}=125^{\circ}C$		2.05		V
		$I_F=75A, T_{vj}=150^{\circ}C$		2.1		V
Recovered Charge	Q_{rr}	$I_F=75A, V_R=600V,$ $-di_F/dt=900A/\mu s, T_{vj}=25^{\circ}C$		4.2		μC
Peak Reverse Recovery Current	I_{rr}			75		A
Reverse Recovery Energy	E_{rec}			2.06		mJ
Recovered Charge	Q_{rr}	$I_F=75A, V_R=600V,$ $-di_F/dt=900A/\mu s, T_{vj}=125^{\circ}C$		9.6		μC
Peak Reverse Recovery Current	I_{rr}			92		A
Reverse Recovery Energy	E_{rec}			4.34		mJ

● IGBT- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	40	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	80	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vjmax}=175^{\circ}C$	300	W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.2mA, T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.9	2.3	V
		$I_C=40A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.2		V
		$I_C=40A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.4		V
Gate Charge	Q_g			0.27		μC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		2		nF
Reverse Transfer Capacitance	C_{res}			0.07		
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=40A, V_{GE}=\pm 15V, R_G=13\Omega, T_{vj}=25^{\circ}C$		198		ns
Rise Time	t_r			24		
Turn-Off Delay Time	$t_{d(off)}$			360		
Fall Time	t_f			72		
Turn-On Energy	E_{on}			4.25		mJ
Turn-Off Energy	E_{off}			2.0		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V, I_C=40A, V_{GE}=\pm 15V, R_G=13\Omega, T_{vj}=125^{\circ}C$		210		ns
Rise Time	t_r			28		
Turn-Off Delay Time	$t_{d(off)}$			470		
Fall Time	t_f			90		
Turn-On Energy	E_{on}			6.04		mJ
Turn-Off Energy	E_{off}			3.05		
SC Data	I_{SC}	$T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C, V_{CC}=900V, V_{CEM} \leq 1200V$		200		A

● Diode- Brake-chopper

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		35	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	70	A
I^2t -value	I^2t	$V_R=0, t_p=10ms, T_{vj}=125^{\circ}C$	240	A^2s
		$V_R=0, t_p=10ms, T_{vj}=150^{\circ}C$	220	

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_F	$I_F=35A, T_{vj}=25^{\circ}C$		1.95	2.45	V
		$I_F=35A, T_{vj}=125^{\circ}C$		1.95		V
		$I_F=35A, T_{vj}=150^{\circ}C$		1.90		V
Recovered Charge	Q_{rr}	$I_F=35A, V_R=600V,$ $-di_F/dt=1600A/\mu s, T_{vj}=25^{\circ}C$		4.15		μC
Peak Reverse Recovery Current	I_{rr}			42		A
Reverse Recovery Energy	E_{rec}			1.3		mJ
Recovered Charge	Q_{rr}	$I_F=35A, V_R=600V,$ $-di_F/dt=1600A/\mu s, T_{vj}=125^{\circ}C$		8		μC
Peak Reverse Recovery Current	I_{rr}			46		A
Reverse Recovery Energy	E_{rec}			2.38		mJ

● Diode- Rectifier

Maximum Ratings

Parameter	Symbol	Test Conditions	Rating	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	1600	V
Average On-state Current 50/60Hz, sine wave	$I_{F(AV)}$	$T_C=100^{\circ}\text{C}$	80	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	$T_C=100^{\circ}\text{C}$	120	A
Surge Forward Current	I_{FSM}	$V_R=0, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$	1100	A
I^2t -value	I^2t	$V_R=0, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$	6050	A^2s

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F=50\text{A}, T_j=150^{\circ}\text{C}$		0.98		V
Reverse Current	I_r	$T_j=125^{\circ}\text{C}, V_R=1600\text{V}$			2	mA

● NTC-Thermistor

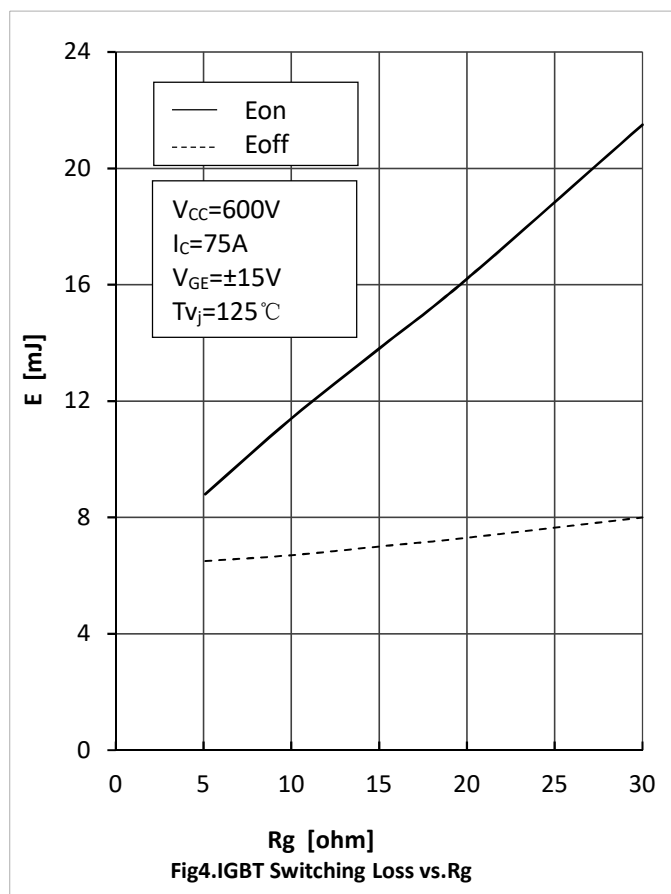
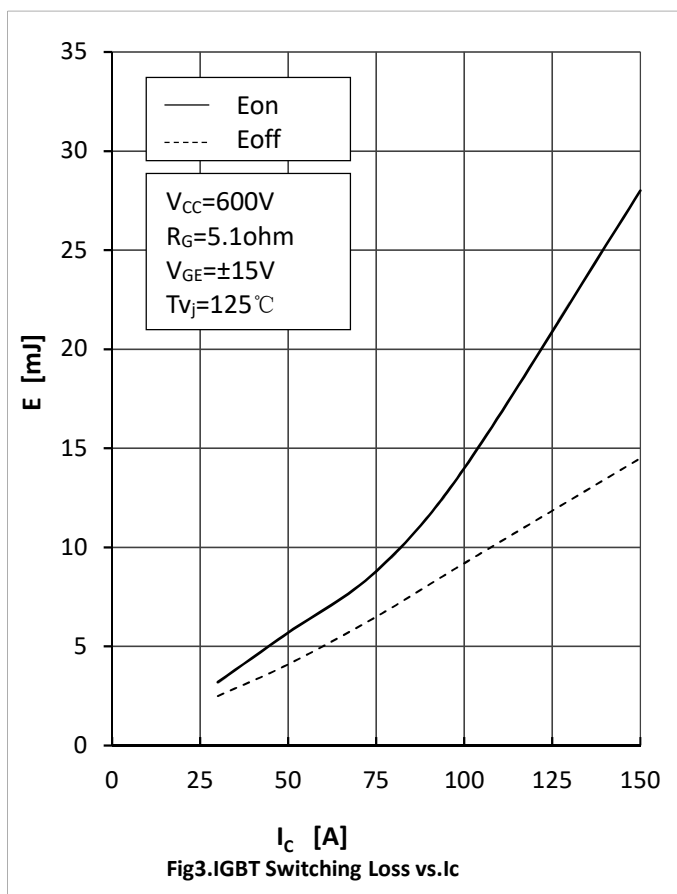
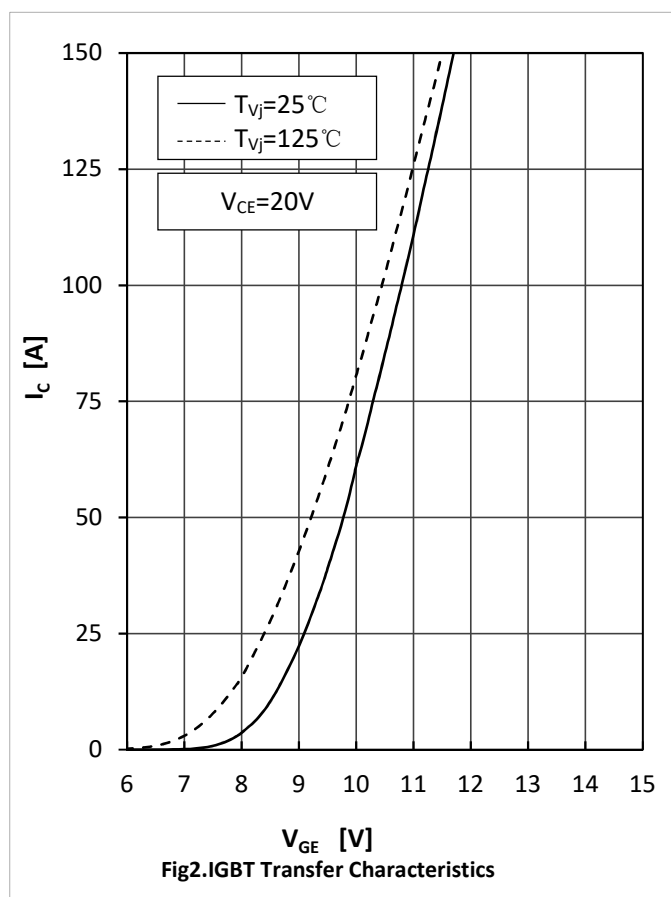
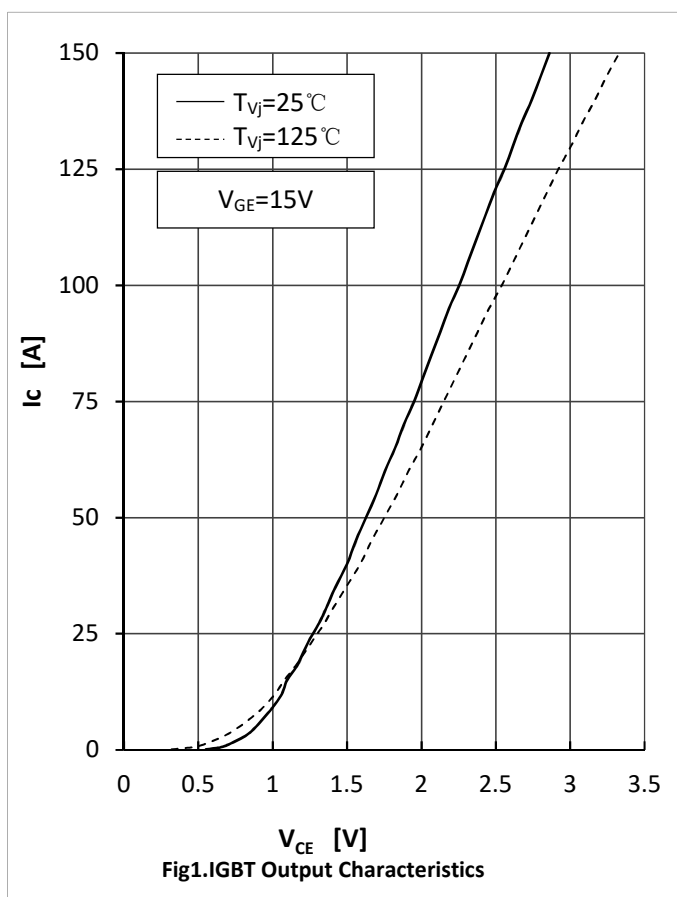
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Rated Resistance	R_{25}			5		$\text{k}\Omega$
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}			20		mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

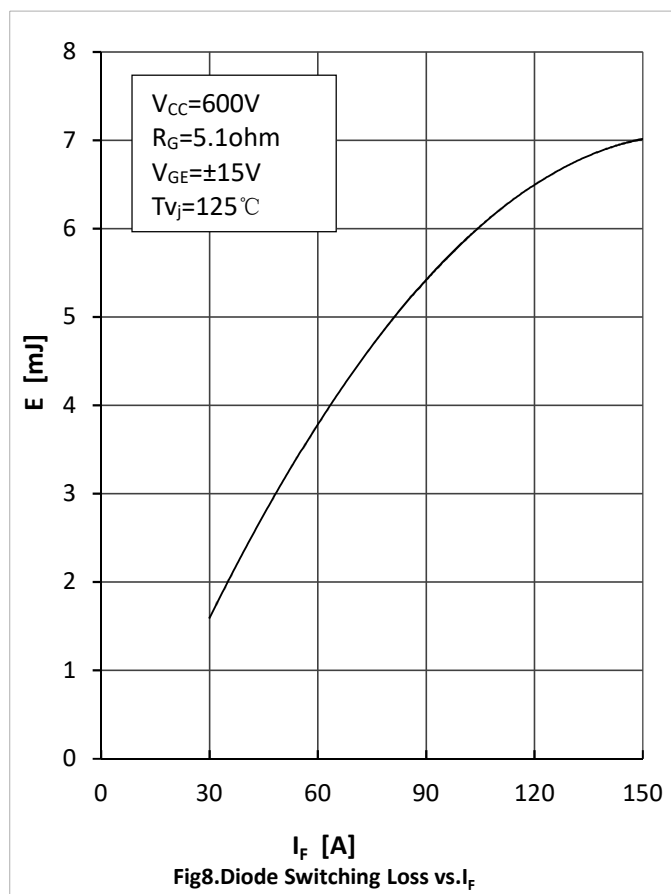
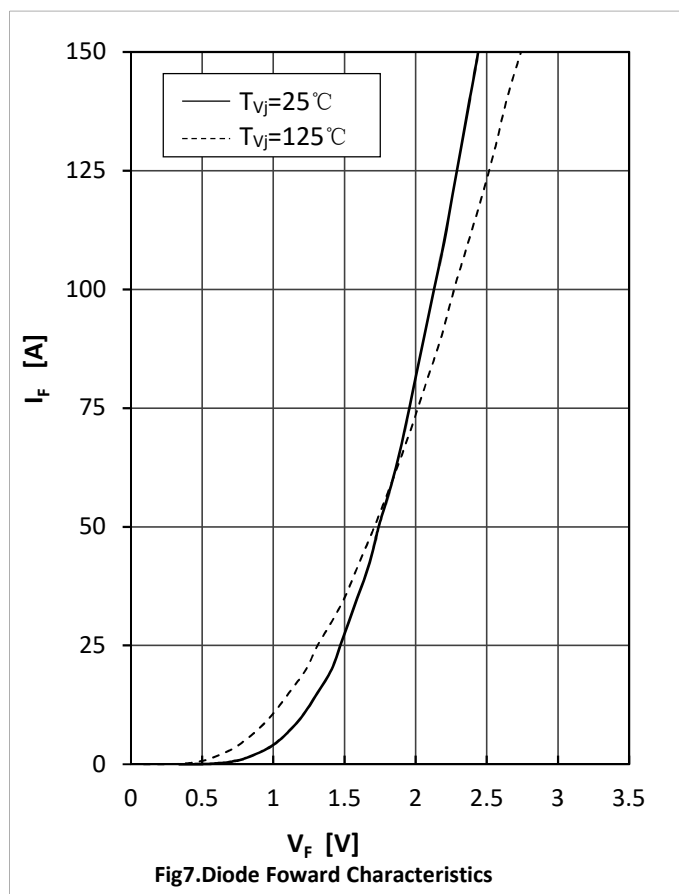
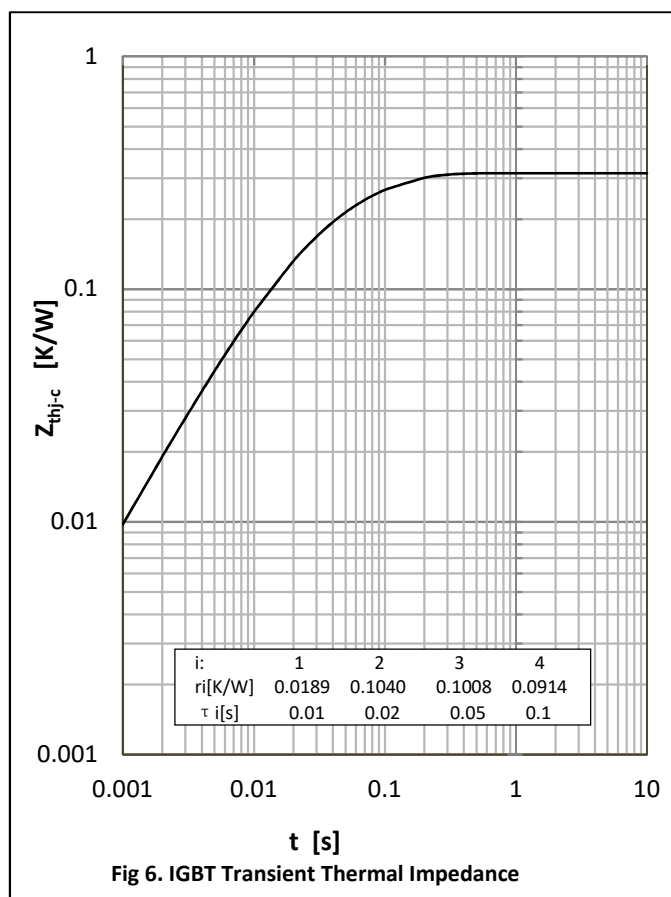
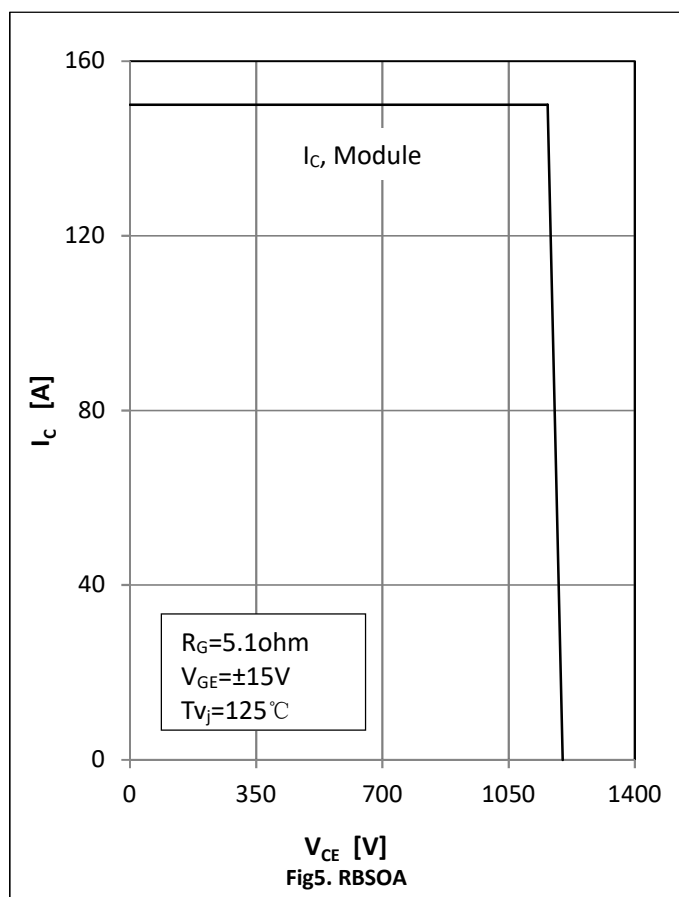
● Module Characteristics($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Isolation voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}	Inverter, brake			175	$^{\circ}\text{C}$
		rectifier			175	
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Operating Junction Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Stray Inductance	L_{CE}			60		nH
Module Lead Resistance , Terminal to Chip	$R_{\text{cc'+EE'}}$	$T_C=25^{\circ}\text{C}$, per switch		4		m Ω
	$R_{\text{AA'+CC'}}$			3		
Thermal Resistance Junction to Case	$R_{\theta\text{jc}}$	per IGBT-inverter			0.339	K/W
		per Diode-inverter			0.619	
		per IGBT-brake-chopper			0.5	
		per Diode-chopper			1.266	
		per Diode-rectifier			0.635	
Thermal Resistance Case to Sink	$R_{\theta\text{cs}}$	per IGBT-inverter		0.121		K/W
		per Diode-inverter		0.221		
		per IGBT-brake-chopper		0.18		
		per Diode-chopper		0.452		
		per Diode-rectifier		0.227		
		per Module		0.009		
Module-to-Sink Torque	M_S		3		6	N·m
Weight of Module	G			300		g

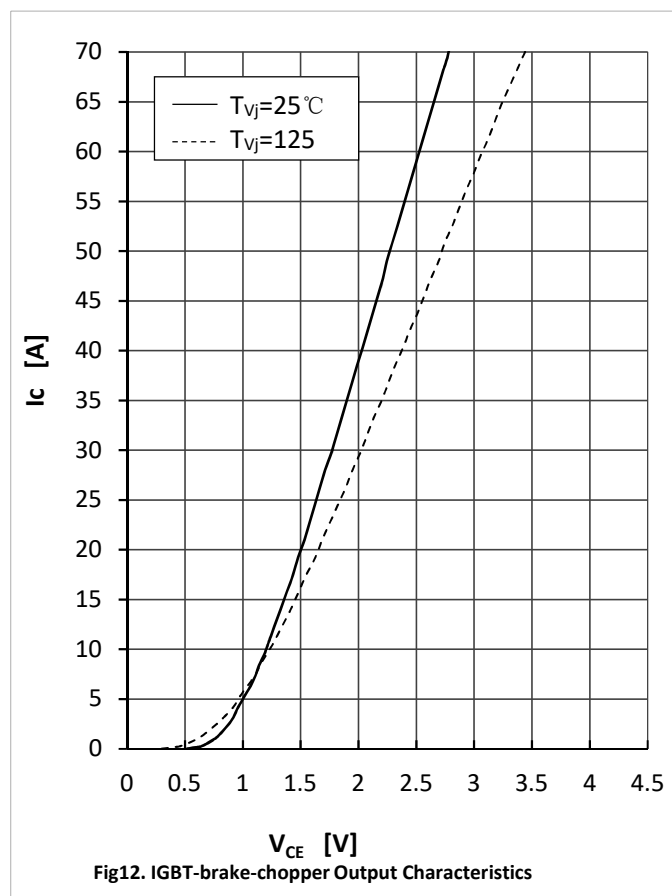
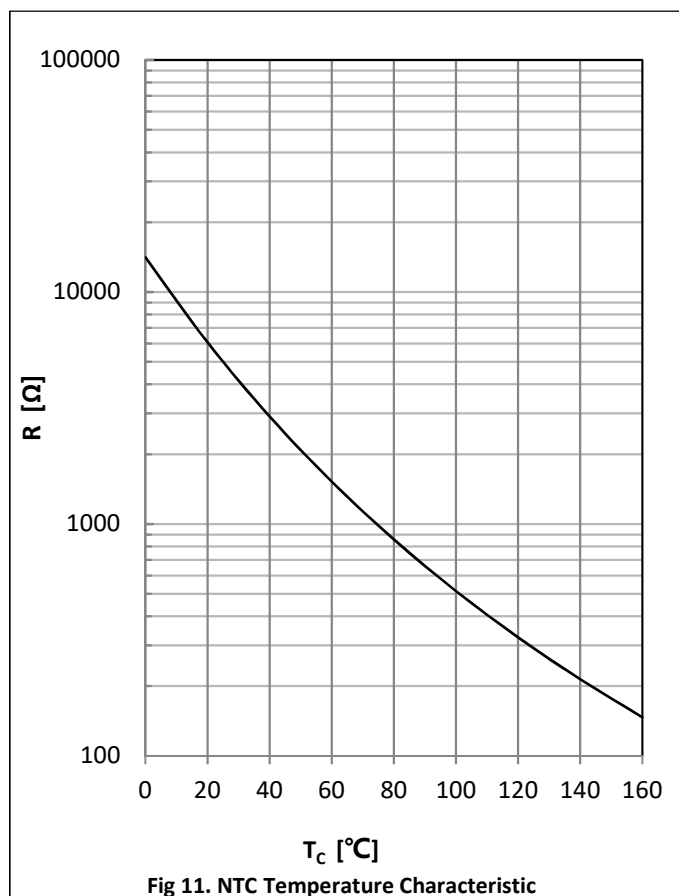
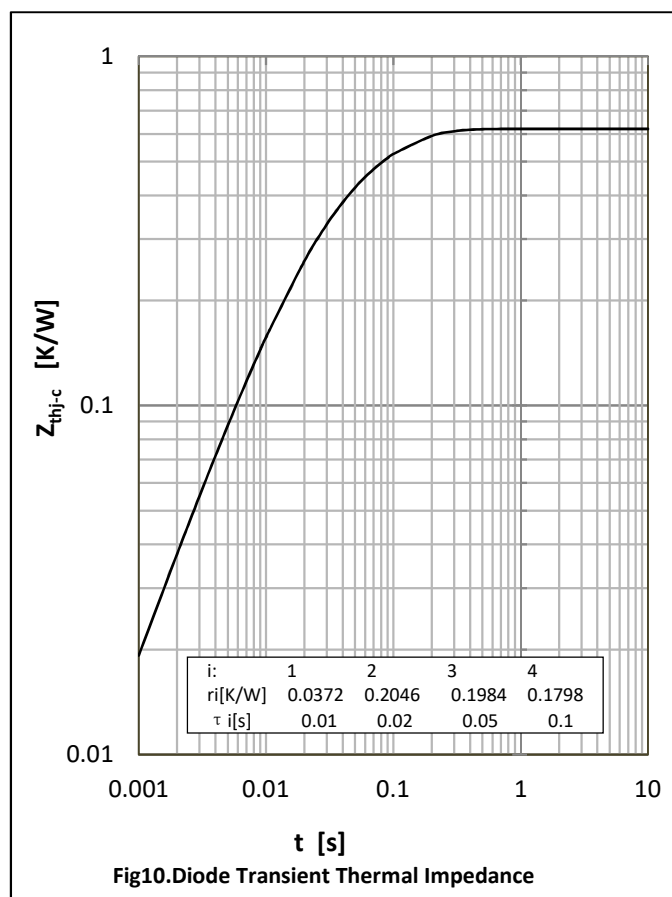
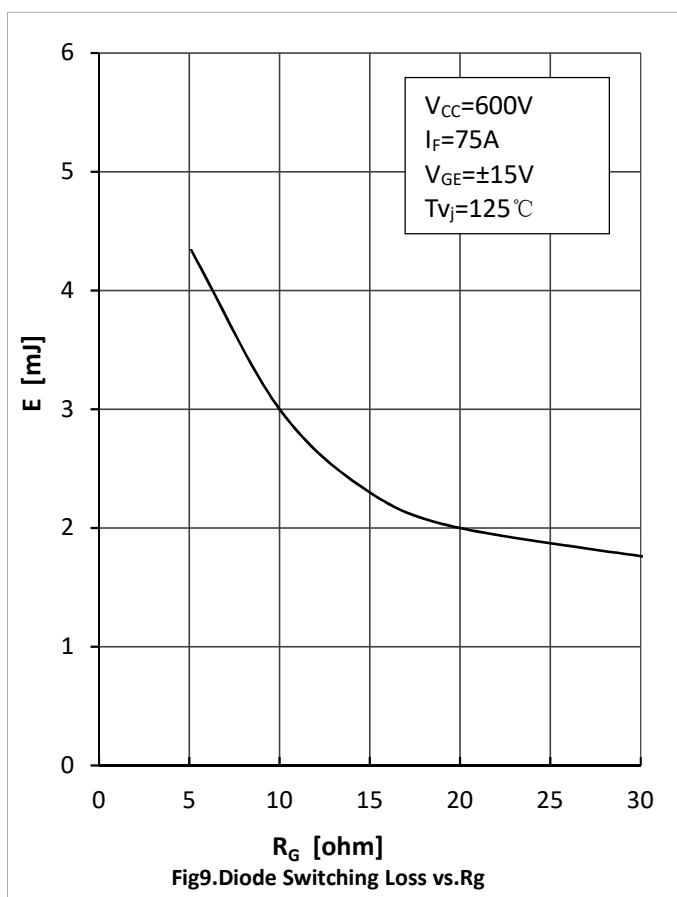
Curve Characteristics



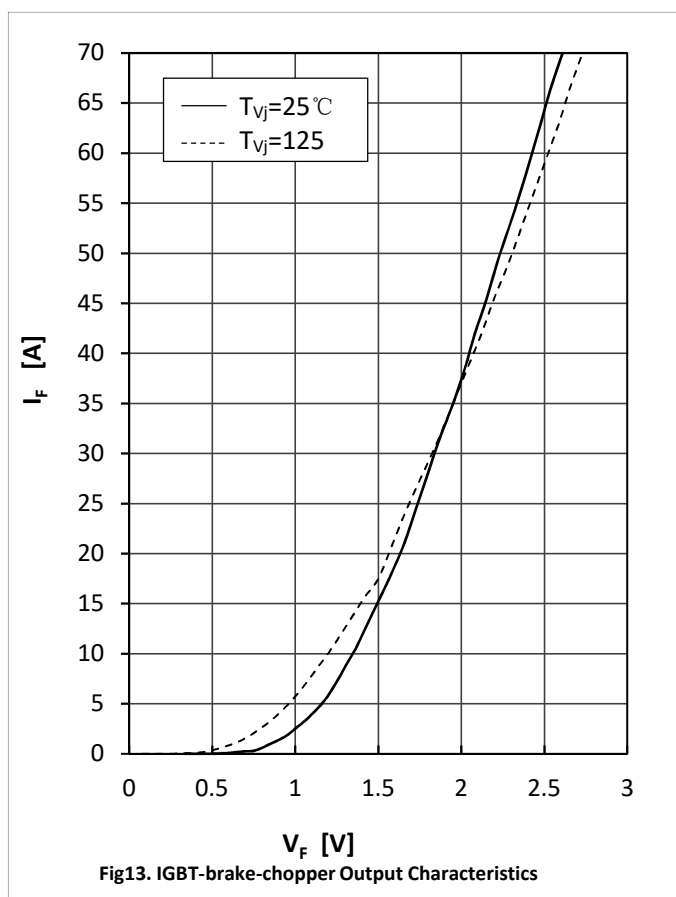
Curve Characteristics



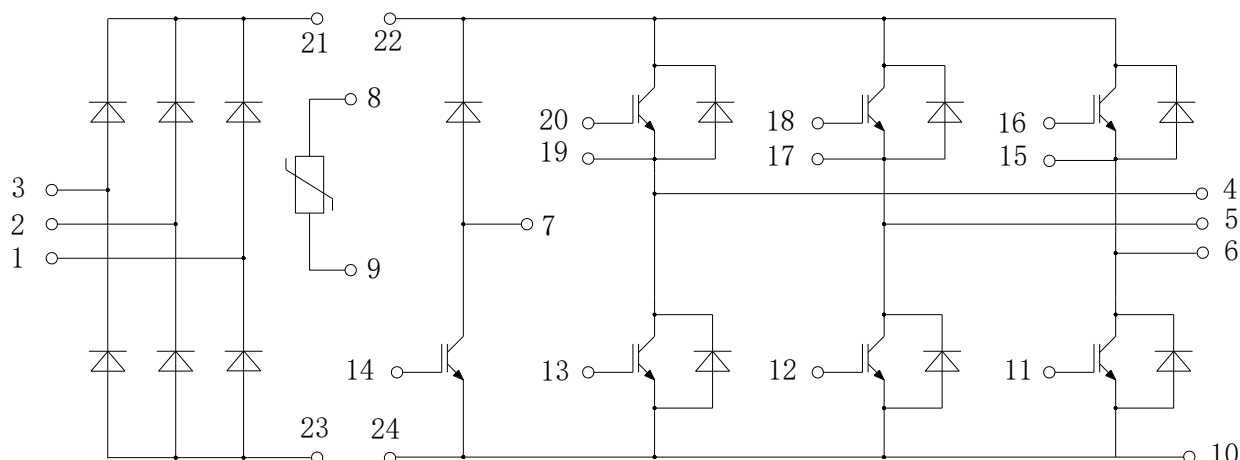
Curve Characteristics



Curve Characteristics



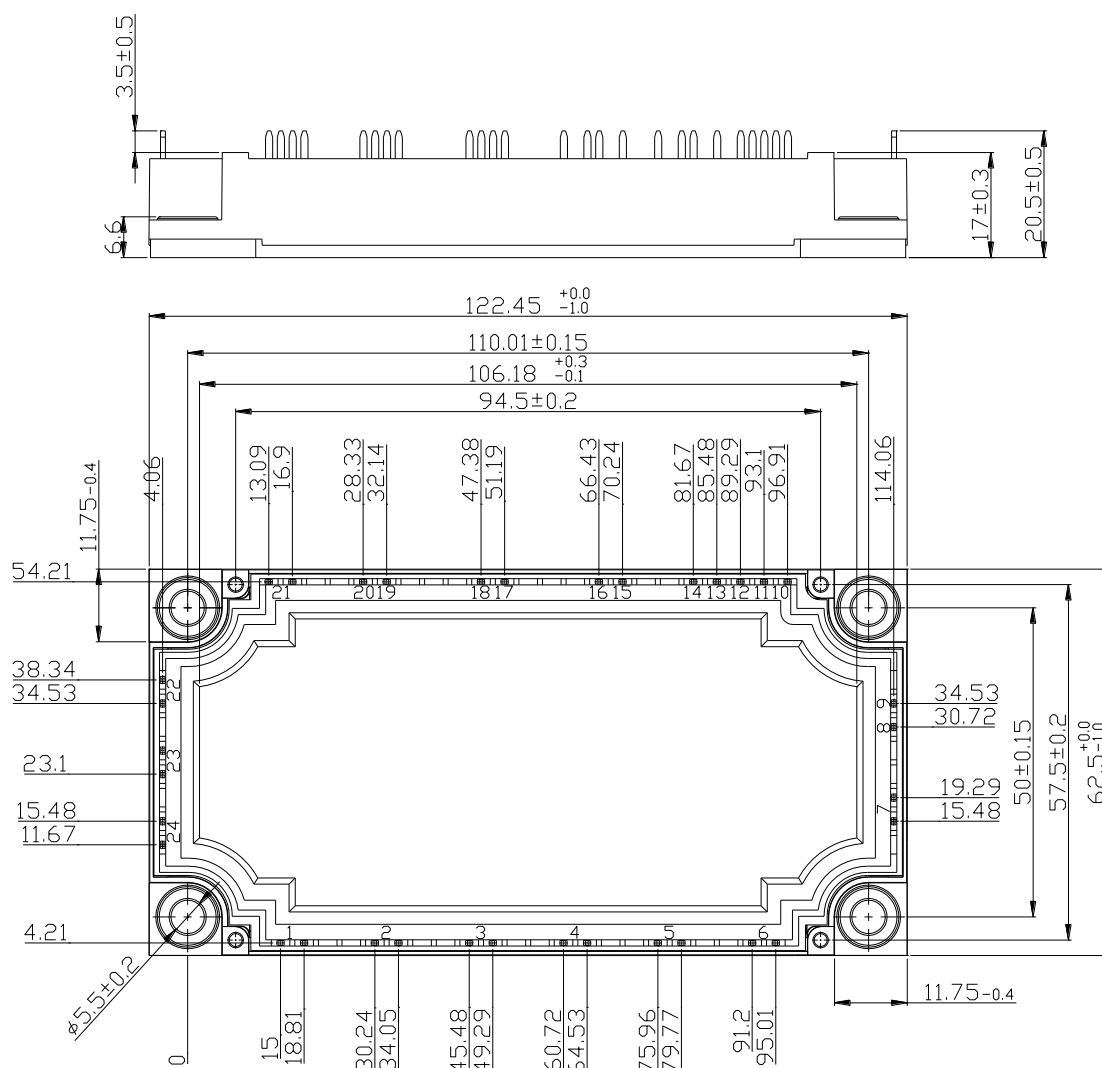
Circuit Diagram



Package Dimensions

Dimensions in mm

E2A



Ordering Information

Device	Packing
Part Number-BP	Bulk: 6pcs/Box ; 42pcs/Ctn

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